Environmental Assessment

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Legionellosis Webinar #1

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National Center for Immunization & Respiratory Diseases
Division of Bacterial Diseases

Outline

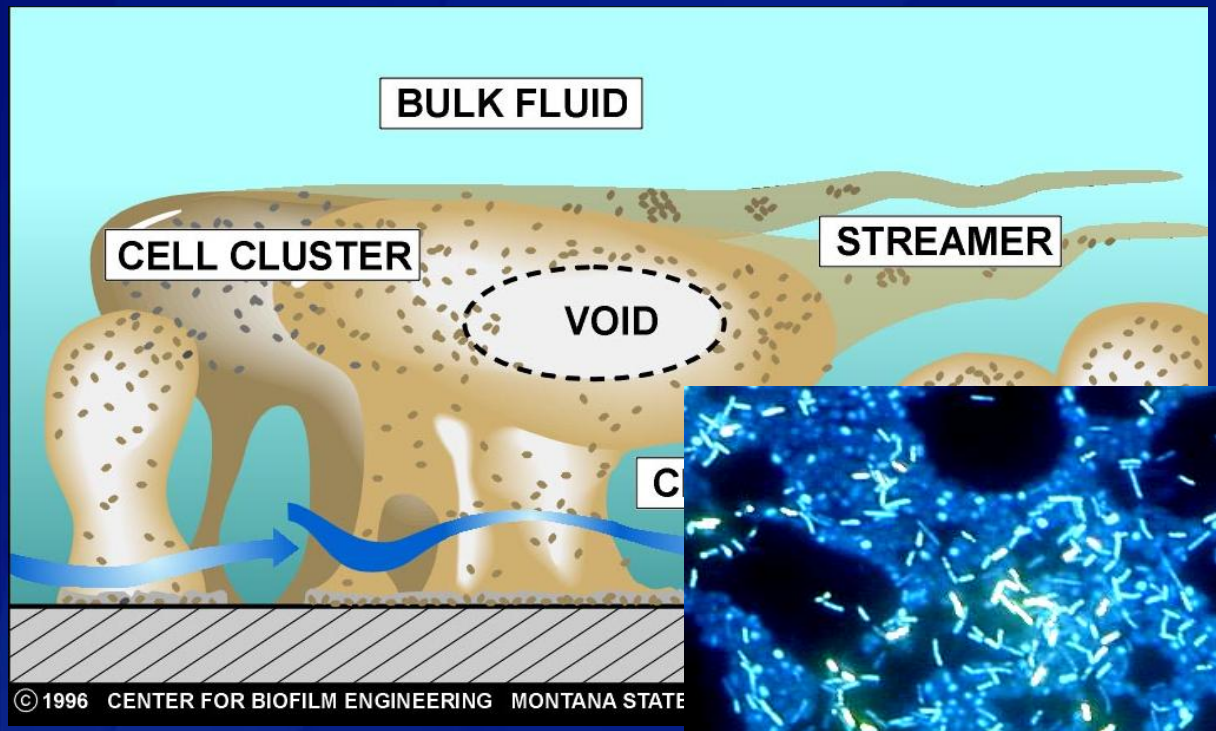
- Ecology of *Legionella*
- Assessment Team
- Environmental Assessment Form

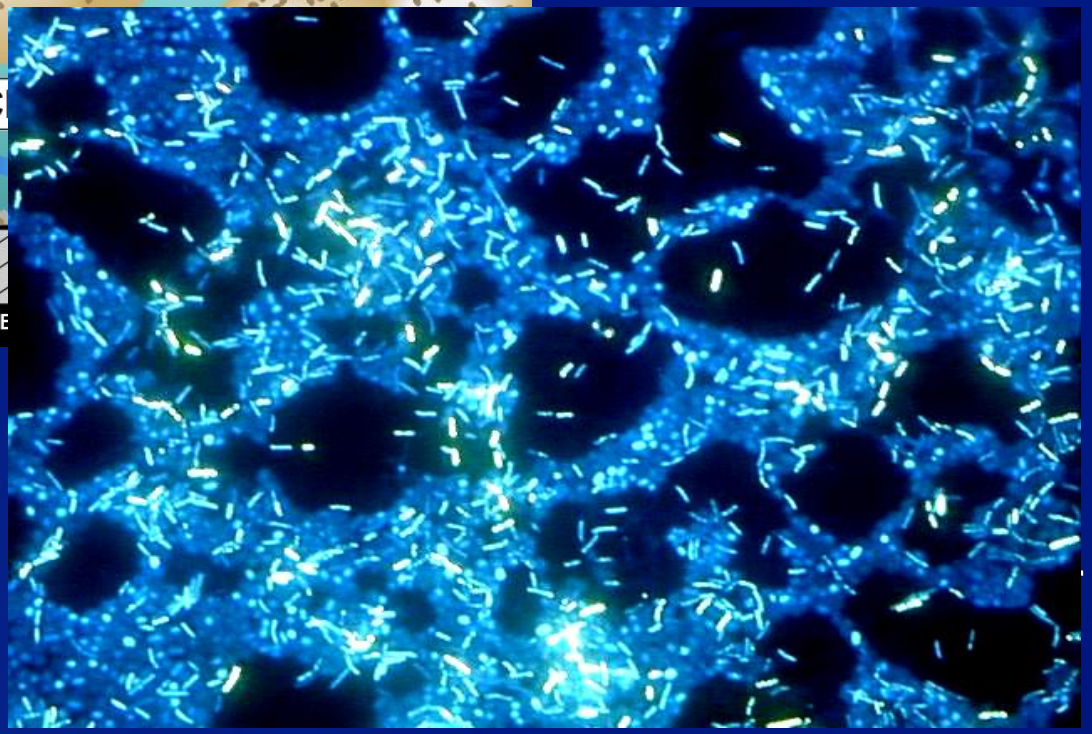
Legionella are ubiquitous in natural and artificial fresh water environments worldwide

Temperature range of *Legionella*

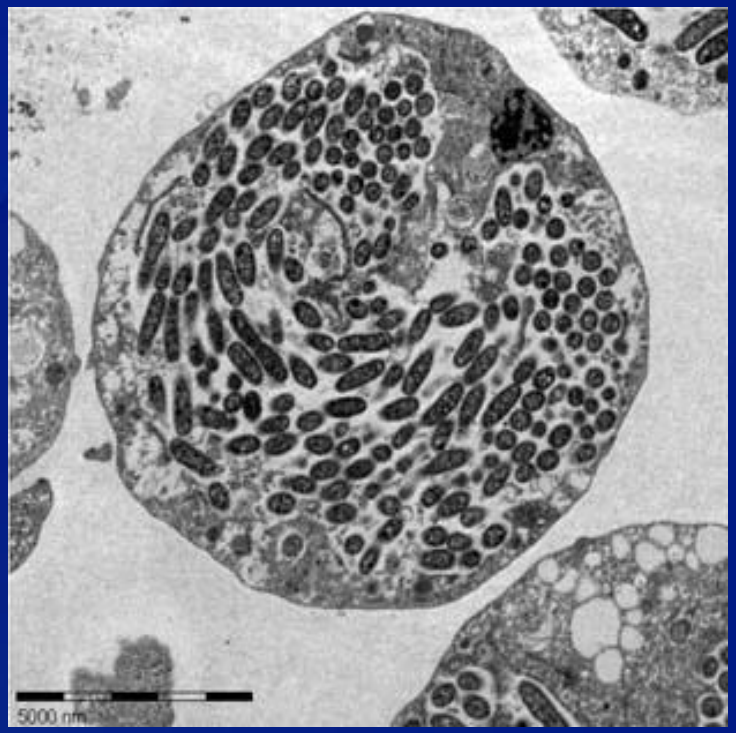
Celsius	25	35	42	45	55
Fahrenheit	77	95	108	113	131

Legionella are biofilm associated





Amoeba – *Legionella's* shelter for adverse environmental conditions



Holland/Özel, Robert Koch-Institut

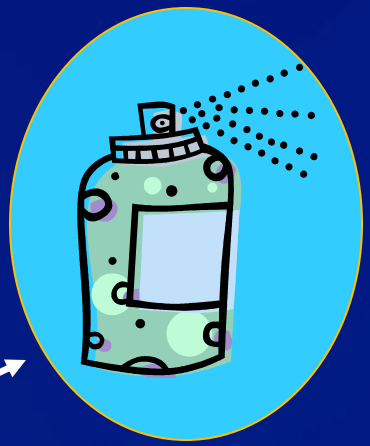
Favorable conditions for *Legionella* amplification:

- Temperature 25ºC - 42ºC (77ºF-108ºF)
- Stagnation
- Scale and sediments
- Biofilms
- Presence of amoebae and protozoa
- Natural rubbers, wood and some plastics support growth; copper inhibits growth

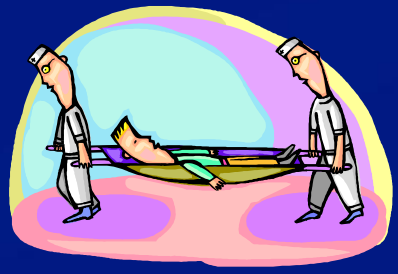
Transmission

Water Supplies

Amplification



Aerosolization

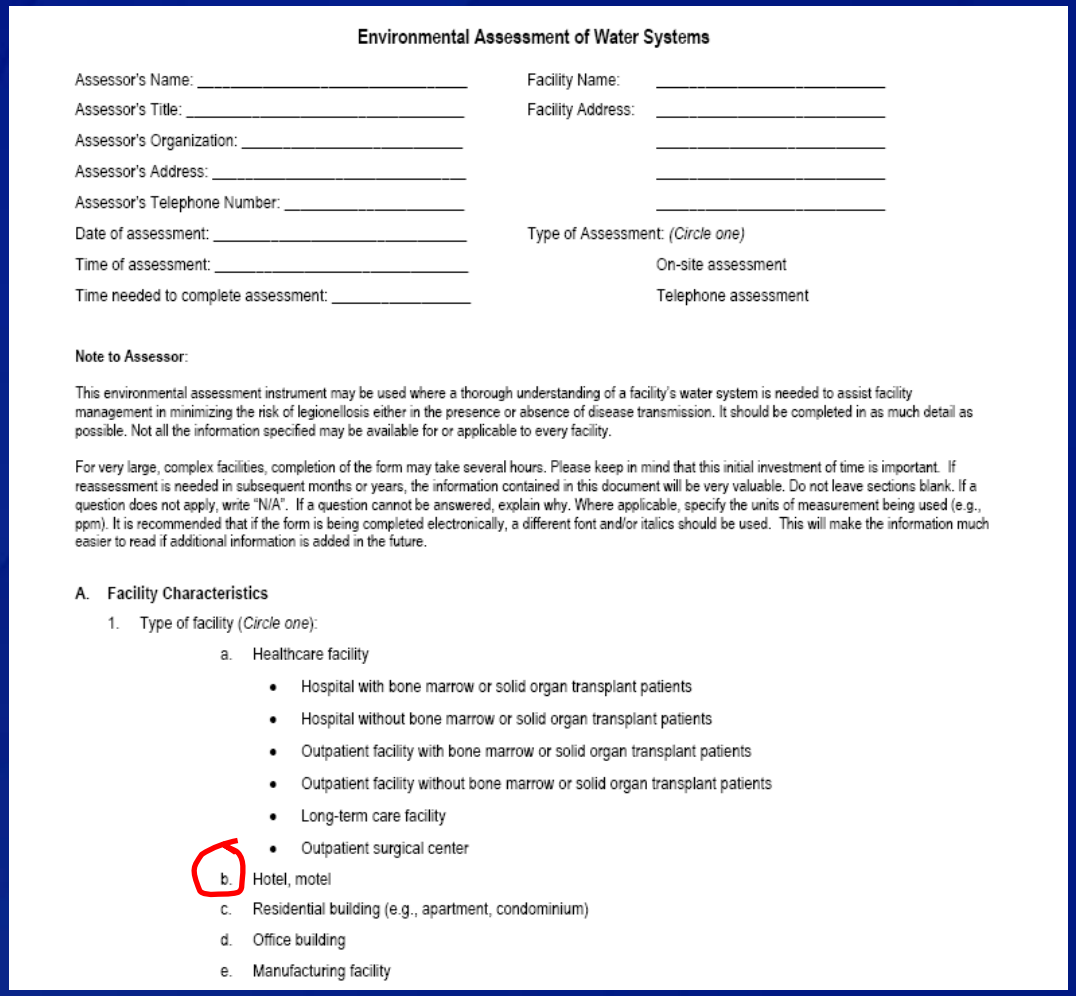


Host

Assessment Team

- A multidisciplinary team of experts
- Thorough understanding of the design and engineering of the particular water system
- Knowledge of any modifications or alterations to the system
- Knowledge of the ecological factors that encourage *Legionella* growth within a system

Environmental Assessment of Water Systems



Environmental Assessment of Water Systems

Assessor's Name: _____
Assessor's Title: _____
Assessor's Organization: _____
Assessor's Address: _____
Assessor's Telephone Number: _____
Date of assessment: _____
Time of assessment: _____
Time needed to complete assessment: _____

Facility Name: _____
Facility Address: _____

Type of Assessment: *(Circle one)*
On-site assessment
Telephone assessment

Note to Assessor:

This environmental assessment instrument may be used where a thorough understanding of a facility's water system is needed to assist facility management in minimizing the risk of legionellosis either in the presence or absence of disease transmission. It should be completed in as much detail as possible. Not all the information specified may be available for or applicable to every facility.

For very large, complex facilities, completion of the form may take several hours. Please keep in mind that this initial investment of time is important. If reassessment is needed in subsequent months or years, the information contained in this document will be very valuable. Do not leave sections blank. If a question does not apply, write "N/A". If a question cannot be answered, explain why. Where applicable, specify the units of measurement being used (e.g., ppm). It is recommended that if the form is being completed electronically, a different font and/or italics should be used. This will make the information much easier to read if additional information is added in the future.

A. Facility Characteristics

1. Type of facility (*Circle one*):
   - a. Healthcare facility
     - Hospital with bone marrow or solid organ transplant patients
     - Hospital without bone marrow or solid organ transplant patients
     - Outpatient facility with bone marrow or solid organ transplant patients
     - Outpatient facility without bone marrow or solid organ transplant patients
     - Long-term care facility
     - Outpatient surgical center
   - b. Hotel, motel
   - c. Residential building (e.g., apartment, condominium)
   - d. Office building
   - e. Manufacturing facility

www.cdc.gov/legionella/files/EnvironmentalAssessmentInstrument.pdf

Environmental assessment of water systems

A. Facility characteristics
B. Outside water supply
C. Design of the existing potable water system
D. a) Whirlpool spas and hot tubs

   b) Cooling towers and evaporative condensers

E. Recent or ongoing construction

Facility characteristics

Page 2

2. Total number of buildings in facility
3. Total number of rooms that can be occupied overnight
4. Total overnight occupant capacity
5. Average occupancy over previous 12 months as a percentage of total capacity…..

Size of the hotel, presence and number of guests who may be exposed, possible time of low usage

Facility characteristics

Page 3

10. Description of **each** building that shares water or air systems with the facility (and including the main facility):

Building Name *List main facility building first*	Original Construction	Later Construction (renovation, expansion)	Stories	Sq. feet	Occupant rooms*	Census (yr. avg.)	Use *List all types of uses*
	Year Completed	From/To or N/A	#	Ft²	# or NA	#/day or NA	e.g., occupant rooms, utilities, heating/AC plant, potable water
1.							
2.							
3.							
4.							
5.							

Size of the hotel, complexity, expansion, constructions, number of guests, water system

Facility characteristics

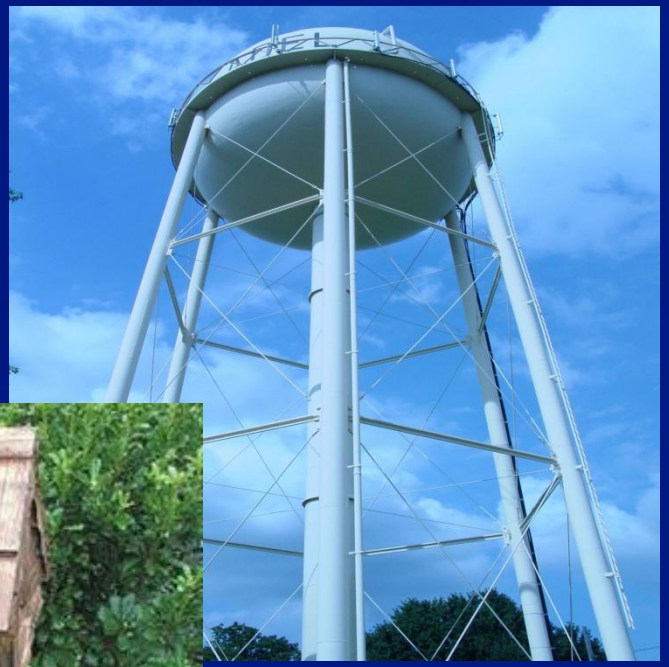
Risk factors

11. Can windows in any occupant rooms be opened?

12. Are there decorative fountains, misters, water features, or any other aerosol-generating devices anywhere on the facility premises?

13. Has this facility been associated with a previous legionellosis cluster or outbreak?

Outside water supply



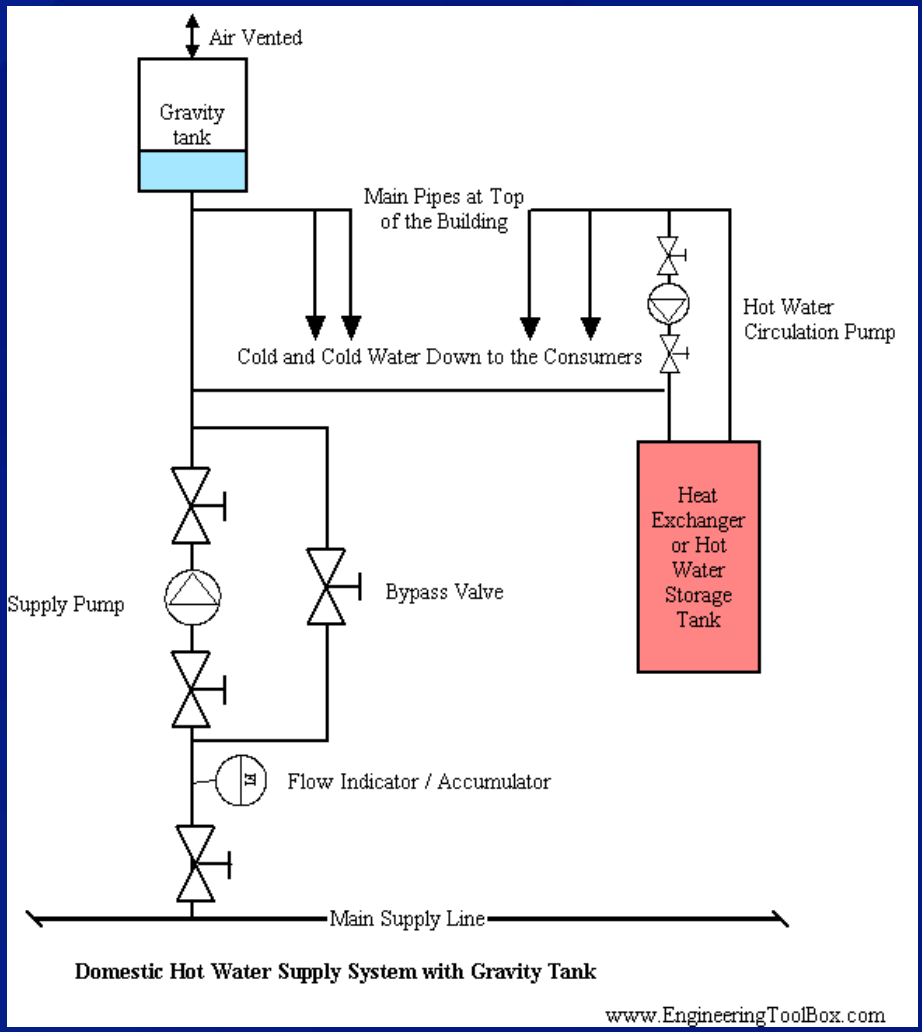
Outside water supply

1. What is the source of the water used by the facility?

3. How is municipal water disinfected?

4. Has treatment of municipal water changed in the last six months?

Design of the existing potable water system(s)



Design of the existing potable water system(s)

Page 5

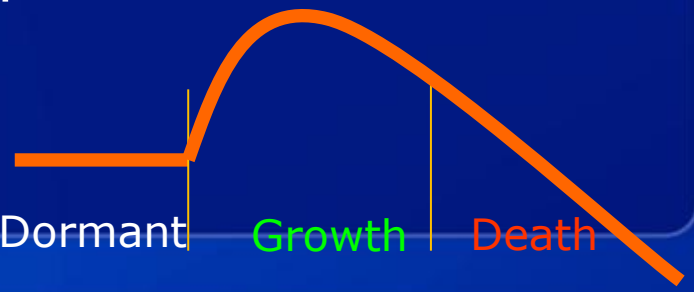
1. What type of heating system is used for the potable hot water system?
2. How is the hot water system configured to deliver water to each building?

Building name	Type of system (I=Instant H=Heater/boiler)	Name of system (e.g., Boiler #1, Loop #1)	Date of installation	Total capacity (gallons)	Usual temperature setting (°F/°C)

Design of the existing potable water system(s)

Pages 5-6

3. Is there a recirculation for the hot water?
4. What is the maximum hot water temperature at the point of delivery permitted by state/local regulations?
5. What are the **lowest** documented **hot** water temperatures measured at any point within the facility?
6. What are the **highest** documented **cold** water temperatures measured at any point within the facility?



Design of the existing potable water system(s)

Pages 6-7

7. Thermostatic mixing valves

8. Water softener on site

10. Measured physical/chemical parameters of the potable water system

Copy from table for question C-2		Area of system (Central heater/ boiler=C; proximal occupant room=P; distal occupant room=D)	Sampling site (e.g., heater #1, tap in occupant room #436)	Type of sample (First, 2-minute)	Temperature (°F/°C)	Chlorine residual (ppm)	pH
Building name	Name of system (e.g., Boiler #1, Loop #1)						

Whirlpool spas and hot tubs

Whirlpool spas and hot tubs

Whirlpool spas and hot tubs

Page 8

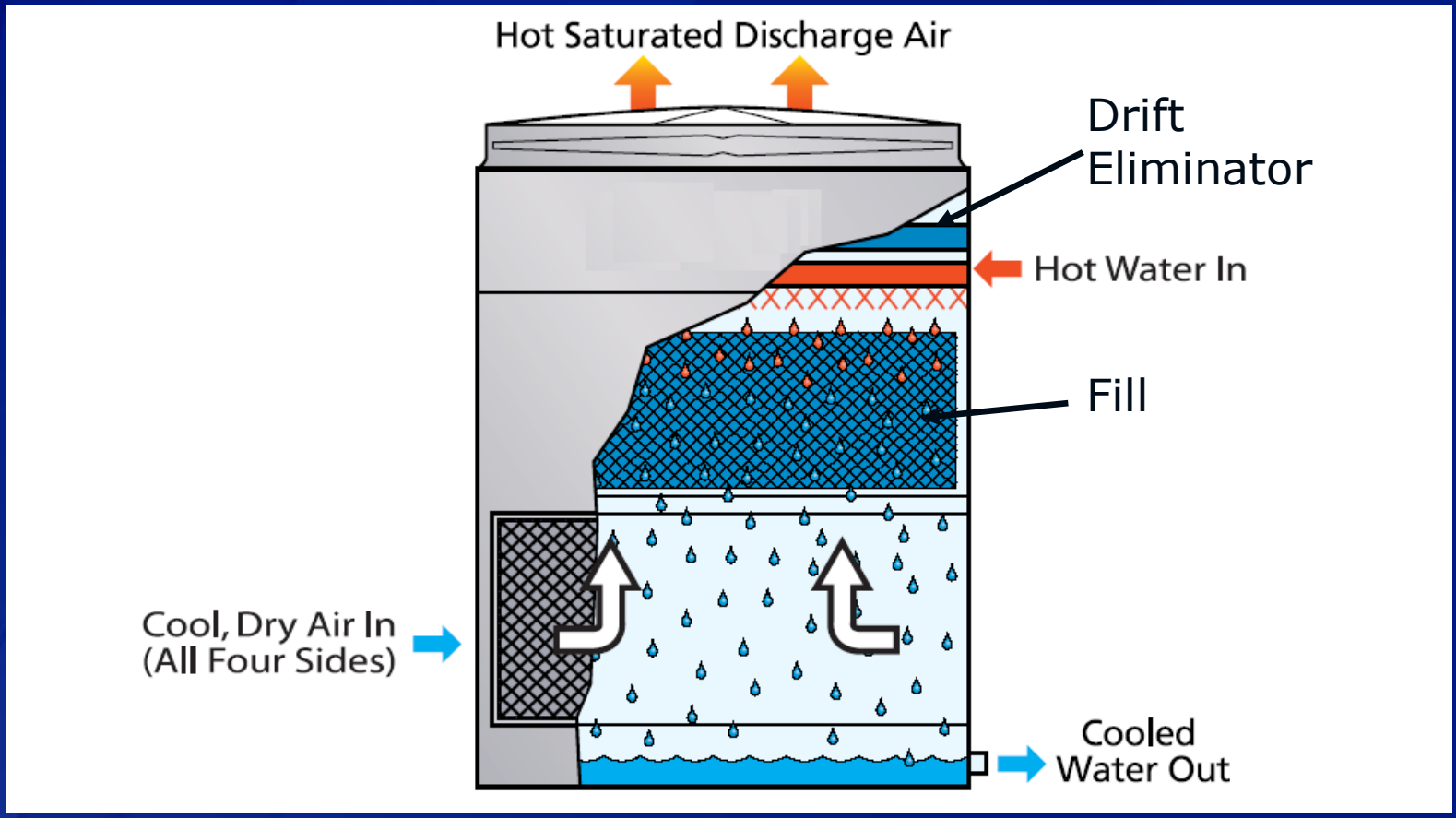
1. How many total spas and/or hot tubs are located on the premises?
2. Spa features

Spa number	1	2	3	4
Location				
Max. bather load				
Filter type				
Age of filter				
Filter maintenance routine				
Type of disinfectant used (include chemical name, formulation, and amount used)				
Method used for adding disinfectant				
Date last drained and scrubbed				

3. Have any of the spas been “shocked” recently?

Cooling towers and evaporative condensers

Cooling tower



Cooling towers and evaporative condensers

Pages 9-10

1. List all cooling towers and evaporative condensers:

Name of device (e.g., CT1, EC2)	Manufacturer	Water capacity (gallons)	Tonnage	Type of disinfects / chemicals used & frequency (continuous, daily, weekly, irregular/intermittent)	Drift eliminators used (Y/N)	Location of device	Distance to nearest air intake*/ location of the air intake	Are cooling towers turned off at any time (Y/N)? If yes, include schedule

2. Recent (last 6 months) special (non-routine) treatments, maintenance or repairs to cooling devices:

Location	Name of device (e.g., CT1, EC2)	Action taken	Date	Comments

3. The source of water

Recent or ongoing construction

Recent or ongoing construction

Page 11

New Building Name	Date construction began	Relationship to existing potable water system Independent=I; Extension of existing system=E	Date water service began	Estimated date of completion	Stories #	Sq. feet Ft²	Used by occupants? Y/N	Uses e.g., occupant rooms, dining, recreation, utilities, heating/AC plant, potable water	Date occupants began occupying building	Floors currently occupied by occupants

1. Temporary water service provided to the new construction area
2. Jack-hammering or pile-driving

Recent or ongoing construction

Pages 12-13

6. Changes of potable water in terms of taste or color during the construction process

7. Any water main breaks, interruptions, or potable water malfunctions in the past 6 months

9. Tests of the fire protection system

References:

- Centers for Disease Control and Prevention. **Legionellosis Resource Site**: www.cdc.gov/legionella/index.htm

- American Society of Heating, Refrigeration, and Air-Conditioning Engineers. 2000. **ASHRAE Guideline 12-2000 – Minimizing the risk of legionellosis associated with building water systems.** www.ashrae.org; www.baltimoreaircoil.com, or www.marleyct.com/publications.asp.

- European Surveillance Scheme for Travel Associated Legionnaires' Disease and European Working Group for Legionella Infection. 2005. **European Guidelines for Control and Prevention of Travel Associated Legionnaires' Disease** http://ewgli.org/data/european_guidelines/european_guidelines_jan05.pdf

- ***Legionella* and the Prevention of Legionellosis**, edited by Jamie Bartram *et al*. 2007, WHO.

Summary

- Any fresh water system under conditions that permit *Legionella* proliferation and creation of a spray or aerosol could be a source of *Legionella* contamination
- Environmental Assessment helps to reveal these conditions and it is the essential step in an outbreak investigation

For more information please contact Centers for Disease Control and Prevention

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Telephone, 1-800-CDC-INFO (232-4636)/TTY: 1-888-232-6348
E-mail: cdcinfo@cdc.gov Web: www.cdc.gov